The Holothuroidea Collected by the Royal Society Expedition to Southern Chile, 1958–1959

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ABSTRACT: The holothurians collected by the Royal Society Expedition to southern Chile, totalling 180 specimens, are described. Ten genera (of which one is new) and ten species are represented. *Neopsolidium* n.g., type species *Psolidium convergens* (Herouard), is erected to accommodate those species in the genus *Psolidium* (sensu lato) in which the dorsal plates are reduced to a diameter of about 0.4 mm.

The holothurian fauna of southern Chile is generalised, containing few restricted species, and sharing many elements with distant subantarctic islands and with Antarctica.

DURING late 1958 and early 1959 an expedition sponsored by the Royal Society carried out marine and terrestrial observations and collections in southern Chile. Stations were established in three separate areas, namely:

1. Isla Chiloe (approx. 42° S)
2. Puerto Eden to Punta Arenas (approx. 49° S to 52° S)
3. Isla Navarino and southern regions (approx. 55° S).

These three areas, considered together, were expected to provide a good picture of the changes in flora and fauna along the Patagonian coastline. The present paper contains an account of the holothurians collected by the marine biologist to the expedition, Prof. G. A. Knox, of Canterbury University, Christchurch.

A total of 180 specimens of holothurians were collected, and these comprise 10 genera and 10 species. The collection represents a good cross-section of the known fauna, although a number of species, hitherto regarded as common, were not found.

The shallow-water holothurian fauna of southern Chile is not large in terms of species, although a wide variety of genera are represented. This is particularly true for the order Dendrochirotida. Previous authors such as Ludwig (1898*a*, 1898*b*), Perrier (1905), Ekman (1925), and Deichmann (1947) have provided a clear picture of the composition of the fauna. It is unlikely that many new shallow-water species will be taken from this region.

I am grateful for the opportunity to study this most interesting collection, and I would like to thank Prof. G. A. Knox and the Royal Society for making this material available to me.

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LIST OF SPECIES COLLECTED

Order Dendrochirotida
- Family Phyllophoridae
  - Subfamily Thyonidiinae Heding and Panning, 1954
    - *Athyonidium chilensis* (Semper)
- Family Cucumariidae
  - Subfamily Cucumariinae
    - *Cladodactyla crocea* (Lesson)
    - *Stereoderma laevigata* (Verrill)
    - *Pseudocnus dubiosus* (Semper)
  - Subfamily Colochirinae Panning, 1949
    - *Trachythyone lechleri* (Lampert)
  - Family Psolidae
    - *Neopsolidium convergens* (Herouard)
    - *Psolus patagonicus* (Ekman)

Order Apodida
- Family Chiridotidae
  - *Chiridota pisanii* (Ludwig)
  - *Trochodota purpurea* (Lesson)
  - *Taeniogyrus contortus* (Ludwig)

Order Molpadida—none

Order Aspidochirotida—none

Order Elasipodida—none

MATERIAL EXAMINED

180 specimens were collected from 12 of the 78 stations worked. Collecting was done by hand in the intertidal zone, by diving, dredging, or seine netting.

Area 1, Isla Chiloe, Stations 1–18

Sta. 4. Punta Gaviota, 42° 03′ 50″ S, 74° 02′ 50″ W; intertidal boulder beach, volcanic rocks; hand collecting; Oct. 4, 11, and 16, 1958.
Athyonidium chilensis (Semper), 4 specimens

Area 2, Puerto Eden to Punta Arenas, Stations 19–49

Sta. 19. Puerto Eden, Isla Wellington, the point to the north of the FACh base, 49° 08′ 20″ S, 74° 26′ 55″ W; intertidal granitic gneiss rocks, sheltered; hand collecting, also collection from *Macrocystis* fronds and holdfasts and sublittoral collection by diving; Nov. 29 and 30, 1958.
Pseudocnus dubiosus (Semper), 1 specimen

Sta. 27. Isla Carlos, 49° 09′ 35″ S, 74° 25′ 24″ W; collection from *Macrocystis* fronds and holdfasts; Dec. 5, 1958.
Pseudocnus dubiosus (Semper), 57 specimens

Sta. 37. Caletta Lackawana, 49° 10′ 32″ S, 74° 25′ 52″ W; depth 18 m, sand, rock, shell; dredge; Dec. 9, 1958.
Stereoderma laevigata (Verrill), 1 specimen

Sta. 39. Puerto Eden, west side of Canal Sur, 49° 09′ 52″ S, 74° 26′ 08″ W; intertidal boulder beach of granitic gneiss; hand collecting and collection from *Macrocystis* fronds and holdfasts; Dec. 9 and 11, 1958.
Pseudocnus dubiosus (Semper), 15 specimens
Psolus patagonicus Ekman, 30 specimens

Sta. 40. Isla Dulce and Isla Levinson, Puerto Eden, 49° 09′ 02″ S, 74° 25′ 10″ W; intertidal and sublittoral granitic gneiss rocks; hand collecting; Dec. 12 and 13, 1958.
Pseudocnus dubiosus (Semper), 2 specimens
Psolus patagonicus Ekman, 1 specimen

Area 3, Isla Navarino and Southern Regions, Stations 50–78

Sta. 50. Puerto Williams, Isla Navarino, 54° 55′ 40″ S, 67° 39′ W; intertidal boulder beach; hand collecting; Jan. 7, 1959.
Neopsolidium convergens (Herouard), fragment

Sta. 52. Puerto Robalo, Isla Navarino, 54° 55′ 50″ S, 67° 41′ 40″ W; intertidal argillite rock; hand collecting and collecting from *Macrocystis* fronds and holdfasts; Jan. 10, 16, 23, and 30, 1959.
Pseudocnus dubiosus (Semper), 10 specimens
Neopsolidium convergens (Herouard), 2 specimens

Sta. 54. Puerto Grandi, Isla Bertrand, 55° 12′ S, 67° 55′ 30″ W; boulder beach; intertidal hand collecting; Jan. 12, 1959.
Pseudocnus dubiosus (Semper), 4 specimens
Trachythyone lechleri (Lampert), 9 specimens

Sta. 73. Seno Grandi, small island opposite Puerto Grandi, 55° 15″ S, 67° 56″ W; collection from *Macrocystis* fronds and holdfasts; Jan. 5, 1959.
Cladodactyla crocea (Lesson), 24 specimens
Neopsolidium convergens (Herouard), 1 specimen (juvenile)
Chiridota pisanii (Ludwig), 4 specimens
Trochodota purpurea (Lesson), 8 specimens
Taeniogyrus contortus (Ludwig), 1 specimen

Sta. 74. Seno Grandi, peninsula on Isla Navarino opposite Puerto Grandi, 55° 11′ 20″ S, 67° 56′ W; collection from *Macrocystis* fronds and holdfasts; Jan. 5, 1959.
Trochodota purpurea (Lesson), 2 specimens

Sta. 77. Puerto Grandi, Isla Bertrand, to the west of the wharf; 55° 12′ S, 67° 55′ 30″ W; intertidal granitic rocks and boulder beach, semi-sheltered, hand collecting; Feb. 7, 1959; collection by diving among *Macrocystis;* Feb. 8, 1959.

Pseudocnus dubiosus (Semper), 1 specimen
Neopsolidium convergens (Herouard), 2 specimens
Trochodota purpurea (Lesson), 1 specimen

SYSTEMATIC ACCOUNT

Order DENDROCHIROTIDA

Family PHYLLOPHORIDAE

Subfamily THYONIDIINAE Heding and Panning, 1954

Genus *Athyonidium* Deichmann, 1941

Eucyclus Lampert, 1885, p. 920; Theel, 1886*a*, p. 268; Ludwig, 1887, p. 1239; Heding and Panning, 1954, p. 36: name preoccupied.

TYPE SPECIES: *Athyonidium chilensis* (Semper).

REMARKS: This genus is monotypic. Deichmann (1941) pointed out that the generic name *Eucyclus* was preoccupied, having been claimed some years earlier for the Mollusca. Heding and Panning (1954) unfortunately persisted with the old generic name.

Athyonidium chilensis (Semper)

Thyone (*Stolus*) *chilensis* Semper, 1868, p. 241, pl. 40, figs. 3–6; Lampert, 1885, p. 156.
Eucyclus duplicatus Lampert, 1885, p. 250; Theel, 1886*a*, p. 268.
Thyone chilensis Theel, 1886*a*, p. 139.
Phyllophorus chilensis Ludwig, 1886, p. 24.
Athyonidium chilensis Deichmann, 1941, p. 127.
Eucyclus chilensis Heding and Panning, 1954, p. 36, fig. 2.

DIAGNOSIS: Large forms (25 cm) with thick, soft skin and numerous stout feet. Tentacles, five large external pairs and five small inner pairs. Calcareous ring with five stout, almost rectangular radials and five insignificant interradials, often completely concealed in surrounding tissue. One large dorsal stone canal, often branched, and one or two tufts of smaller stone canals with minute heads. Numerous tufts of branched Polian vesicles. Inner anatomy otherwise typical of the family.

Deposits large, well-developed end plates, a few perforated spinous rods; tentacles with few rosettes in younger individuals. Colour greyish mottled to almost black, ventrum paler, tentacles dark. Shallow-water forms. (After Deichmann, 1941.)

MATERIAL EXAMINED: Sta. 4, four specimens from *Macrocystis* zone.

REMARKS: The four specimens in the present collection range in length between 140 mm and 185 mm. The body is covered in tube feet, which are more numerous ventrally. Colour in alcohol is dark brown to blackish dorsally, fading to light brownish-grey on the ventral surface. There are 20 black tentacles arranged in two rings. The outer ring has 10 regularly spaced, profusely branched larger tentacles, averaging about 25 mm in length. The inner ring lies close around the mouth, and comprises five radially placed pairs of short, sparsely branched tentacles of 8 mm average length. The oral field is about 20 mm in diameter. Immediately outside the ring of large tentacles, in the middorsal interradius, lies a small approximately circular mound of tissue about 1 mm high and 2 mm broad, which supports the genital aperture.

The mouth is large, and examination of the intestinal contents in a dissected specimen showed that hard pieces of *Macrocystis* stipe up to 42 mm long and 6 mm wide, or 25 mm × 10 mm can be ingested. The intestine also contains fragments of green algae, both filamentous and thalloid, brown algae (predominantly *Macrocystis*), appendages of small crustaceans, and hydroids. This species seems to be primarily a vegetarian browser.

The calcareous ring is large, and has been illustrated by Heding and Panning (1954).

The gut is thin-walled, and takes a large S-shaped loop. The cloaca is broad, thick-walled, attached to the body wall by very numerous muscle strands. Respiratory trees take the form of two broad flat tubes with scattered, profusely branched tufts of respiratory tubules. The trees arise from the anterior end of the cloaca in the lateral dorsal interradii, and extend anteriorly for about half the length of the body cavity.

A tuft of numerous Polian vesicles arises from the ventral side of the water-vascular ring. The stone canal stems from the dorsal side of the ring, and gives off smaller canals which lie to each side of the strong dorsal mesentery, and terminate in nodular madreporites.

The gonad almost fills the rest of the body cavity, and consists of two bunches of sparsely branched genital caeca, lying one to each side of the dorsal mesentery. The caeca are orange in colour, with white thickenings scattered along their length.

Radial muscles are represented as broad flat straps. The retractor muscles are each split into two or three narrow bands, joined by a thin web of tissue for most of their length.

In the specimen dissected a commensal pinnotherid crab was found in the last branch of the intestine, half way along the body cavity. The crab appeared to have caused little damage to adjacent tissues, apart from a slight rupturing of the wall of the intestine. This rupture might conceivably have been caused during preservation or transport of the specimens.

I found no calcareous deposits in the body wall or in the tube feet, although end plates are known to occur in the tube feet of this species.

Due to the work of Deichmann (1941) and Heding and Panning (1954), the systematic position of this species is now quite clear.

DISTRIBUTION: Deichmann (1941) notes that *Athyonidium chilensis* is probably "the most common phyllophorid known from Chile." The species is also found along the coast of Peru. The present locality record does not affect the known distribution pattern, and it is apparent that this species is reasonably common in the *Macrocystis* zone, immediately below low-tide mark.

Family CUCUMARIIDAE

Subfamily CUCUMARIINAE

Genus *Cladodactyla* Brandt, 1835 emend. Panning, 1940

DIAGNOSIS: Tentacles 10. Calcareous ring small, without bifurcating processes. Skin deposits merely plates. The plates are thin, smooth, developed from forked rods. (After Panning, 1949.)

TYPE SPECIES: *Cladodactyla crocea* (Lesson).

REMARKS: The genus *Cladodactyla* contains three species at the present time. *C. senegalensis* Panning and *C. monodi* Cherbonnier are known from Dakar and the Cameroons coast, respectively.

Cladodactyla crocea (Lesson)

Cucumaria crocea Lesson, 1830, p. 153, pl. 52, figs. 1, 1*a*; Theel, 1886*a*, pp. 58, 110, pl. 12, figs. 1, 2; Ludwig, 1898*a*, p. 15, pl. 1, figs. 6–13 (list of references); Bell, 1908, p. 2; Ekman, 1925, p. 75, figs. 15, 16; Deichmann, 1947, p. 331.

Cladodactyla crocea Panning, 1940, p. 172; Panning, 1949, p. 413; Panning, 1957, p. 27, figs. 12, 13.

DIAGNOSIS: Thin-skinned, small (up to 100 mm), dendrochirotes with equal-sized tentacles. Tube feet restricted to the ambulacra, larger ventrally, smaller and more numerous dorsally (when present); usually arranged into double rows. Calcareous ring simple, with no posterior processes. Deposits perforated rods or platelets, reduced or lacking in older specimens. Tube feet with end plates. Brood-protecting.

MATERIAL EXAMINED: Sta. 73, 24 specimens.

REMARKS: *Cladodactyla crocea* is one of the best-known of the holothurians from southern waters, and I have little to add to the thorough accounts given by the workers listed in the synonymy above. The specimens in the present collection range in total length from 10 mm to 27 mm. Colour in alcohol is light brown to dark greyish-brown. In some specimens, tube feet are entirely lacking from the dorsal radii. Theel (1886) noted that in the 20–40 mm specimens, dorsal tube feet are wanting, but this is not the case in all of the specimens in the present collection. I found no juveniles on the dorsal surface of any specimens, although Theel's (1886) material, which was collected at about the same time of the year, included some specimens carrying broods of juveniles. Examination of the gonad in the larger specimens in my collection indicated that sexual maturity had not as yet been reached.

Calcareous deposits proved to be very rare, the tentacles sometimes containing isolated perforated rods in the smallest specimens (Fig. 1, *1*). In larger specimens the tentacle rods were mainly absent. With the exception of the end plates in the tube feet (Fig. 1, *2*), body wall deposits tend to be very scarce or lacking altogether. In a single 14 mm specimen I found but three deposits in the skin of the dorsal side (Fig. 1, *3*). These took the form of perforated platelets.

The features of the internal anatomy have already been described.

DISTRIBUTION: *Cladodactyla crocea* is most commonly found at the southern tip of South America, about the Straits of Magellan, and along the eastern coast of southern South America, as far north as the mouth of the Rio de la Plata. The species is also known from Kerguelen, South Georgia, and Antarctica (Coulman Is., Hut Point, and Franklin Is.) (Bell, 1908). *C. crocea* has been taken between low-tide mark and 4,300 m, but is most common to depths of about 30 m, often associated with seaweed.

Genus *Stereoderma* Ayres, 1851 emend. Panning, 1949

Pentactella Verrill, 1876.

DIAGNOSIS: Tentacles 10. Calcareous ring simple, without forked processes. Body wall deposits are knobbed plates, all of the same shape, and arranged in one layer; no tables, no rosettes, no cups. (After Panning, 1949.)

TYPE SPECIES: *Stereoderma unisemita* (Stimpson).

REMARKS: The genus *Stereoderma* contains about 12 species at the present time. Four of the species have a circumpolar distribution when considered together.

S. leoninoides (Mortensen), Auckland and Campbell islands.

S. godeffroyi (Semper), west coast of South America 20°–40° S (Deichmann, 1947).

S. laevigata (Verrill), southern end of South America, Falkland Is., Kerguelen Is., Marion Is., the Crozets, Antarctica.

S. perrieri (Ekman), southern Chile, Falkland Is., South Georgia.

These four species seem to be closely related to each other, and their distribution parallels the case of certain species of *Trachythyone* (Pawson, 1962).

Stereoderma laevigata (Verrill)

Pentactella laevigata Verrill, 1876, p. 68; Studer, 1876; Studer, 1879; Smith, 1879, p. 271.

Cucumaria laevigata Theel, 1886*a*, p. 57, pl. III, fig. 5, pl. IV, fig. 13; Lampert, 1886, p. 828; Ludwig, 1898*a*, p. 32, pl. II, fig. 25; Herouard, 1901, p. 44; Perrier, 1905, p. 22; Herouard, 1906, p. 12, pl. 2, figs. 5, 6; Bell, 1908, p. 2; Helfer, 1917, p. 164; Ekman, 1925, p. 56, text fig. 11; Deichmann, 1947.

Cucumaria serrata Theel, 1886*a*, p. 73.

Stereoderma laevigata Panning, 1949, p. 422.

DIAGNOSIS: Tentacles of equal size, feet restricted to the ambulacra, calcareous ring simple. Spicules as oblong plates with one end denticulate, sometimes knobbed with a reticulated network; they are numerous in smaller specimens, more scattered in larger ones. Tube feet have end plates and three-armed rods. Tentacles with perforated rods; introvert with four-holed buttons sometimes with an external reticulum. Total length up to 120 mm. (After Deichmann, 1947.)

MATERIAL EXAMINED: Sta. 37, one specimen.

REMARKS: The single specimen is small (total length 8 mm), and is strongly contracted, with many deep transverse wrinkles. Colour in alcohol is light brown. The calcareous deposits are typical of this species and need no further discussion here. *Stereoderma laevigata* is a species which is readily recognised because of its distinctive calcareous deposits.

DISTRIBUTION: Deichmann (1947) notes that *S. laevigata* is known from the southern tip of South America, the Chile coast, Falkland Is., Kerguelen Is., the Crozets, Marion Is. Bell (1908) reported specimens from the vicinity of McMurdo Bay, Antarctica, to depths of about 41 fathoms.

Genus *Pseudocnus* Panning, 1949

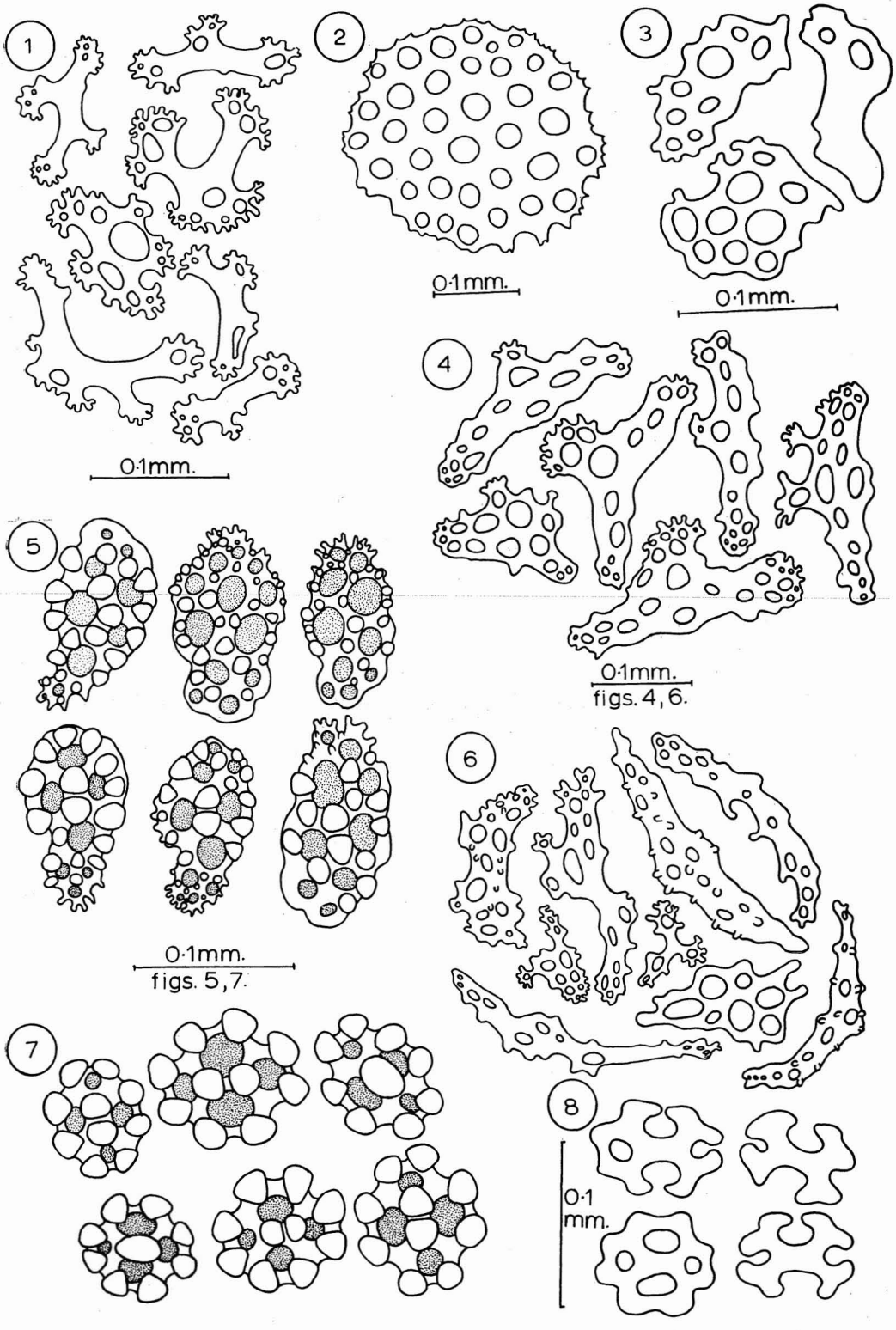
DIAGNOSIS: Tentacles 10. Calcareous ring simple, without posterior processes. In the body wall are knobbed plates of two types in two layers. (After Panning, 1949.)

TYPE SPECIES: *Pseudocnus kollikeri* (Semper).

Pseudocnus dubiosus (Semper)

For synonymy see Panning (1950).

DIAGNOSIS: Medium-sized, length up to 100 mm. Tube feet in five bands, numerous in the dorsal ambulacra. Tentacles bushy, of unequal size. Calcareous ring simple. Deposits numerous oblong knobbed plates (of average length 0.12 mm) with one end denticulate, and four-holed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knobbed buttons (0.9 mm average length). Tube feet with rudimentary end plates or none at all, and numerous perforated supporting rods, mostly three-armed. Introvert and tentacles have perforated plates and rods. (After Deichmann, 1941.)

MATERIAL EXAMINED: Sta. 19, 1 specimen; Sta. 27, 57 specimens; Sta. 39, 15 specimens; Sta. 40, 2 specimens; Sta. 52, 10 specimens; Sta. 54, 4 specimens; Sta. 77, 1 specimen.

REMARKS: The 90 specimens range in length from 10 mm to 50 mm. The colour varies between white and pink. This species is one of the best-known from Chile and has been described by many workers. Panning (1950, 1952) has suggested that there are three "forms" of this species. They are *P. dubiosus-leonina,* from the southern end of South America (all of the present specimens are of this type); *P. dubiosus-dubiosa* ranges the Atlantic and eastern Pacific shores, as far south as Chile; *P. dubiosus-jageri* is known from South Africa.

The deposits of the body wall in the present material (Fig. 1, *5, 7*) are those of the *leonina* form. Small specimens may show stages in the development of knobbed buttons (Fig. 1, *8*). The tube foot deposits (Fig. 1, *4*) are perforated plates, often three-armed, about 0.22 mm in average length. The tentacles contain perforated rods and small plates up to 0.32 mm long (Fig. 1, *6*).

A thorough investigation of all of the species in the genus *Pseudocnus* is urgently needed, particularly those species which have the body wall deposits as plates with one end denticulate, and buttons. For a successful attempt at a revision, a representative range of specimens of each species would be required, and unfortunately these are not available to the writer at the present time.

DISTRIBUTION: The *leonina*-form of this species is known from southern Peru in the west of South America to the Rio de la Plata in the east, and the Falkland Is., from the intertidal zone to approximately 100 m.

Subfamily COLOCHIRINAE

Genus *Trachythyone* Studer, 1876

For synonymy, see Panning (1949).

DIAGNOSIS: Calcareous ring simple, without forked processes. In the skin are cups and smooth plates, the plates imbricating in some species. (After Panning, 1949.)

TYPE SPECIES: *Trachythyone muricata* (Studer).

REMARKS: This genus comprises about 20 species, of which 11 are distributed in the southern Pacific Ocean from Australia to South America and also Kerguelen Is. The remaining species are found in the Indo-west-Pacific and Mediterranean regions.

Trachythyone lechleri (Lampert)

Thyone lechleri Lampert, 1885, p. 253, fig. 64; Theel, 1886*a*, p. 267; Ludwig 1898*a*, p. 44, pls. 2, 3, figs. 26–33; Perrier, 1905, p. 35; Ekman, 1925, p. 101, fig. 22; Deichmann, 1947, p. 335.

Thyone hassleri Theel, 1886*b*, pp. 11–12.

Trachythyone lechleri Panning, 1949, p. 426, figs. 12–14.

DIAGNOSIS: Medium-sized (up to 15 cm total length); colour in alcohol, brown. Tube feet numerous, scattered. Deposits thick oval plates, sparsely perforated, length 0.07–0.2 mm, overlain by rudimentary "cups" of varying shapes. End plates in tube feet surrounded by perforated supporting plates of 0.2 mm average length.

MATERIAL EXAMINED: Sta. 54, nine specimens.

REMARKS: These are typical specimens of this unusual species. The total length ranges from 47 mm (a strongly contracted specimen) to 130 mm. The colour in alcohol is mottled light brown to dark orange-brown. The tube feet are lighter in colour than the rest of the body. In most cases the tentacles are completely retracted.

The calcareous ring is simple, with no posterior processes, and is solid, with the five radials and five interradials firmly fused together. The

FIG. 1. *1–3, Cladodactyla crocea* (Lesson). *1,* Tentacle deposits. *2,* Dorsal tube foot end plate. *3,* Dorsal skin deposits.

4–8, Pseudocnus dubiosus (Semper). *4,* Tube foot deposits. *5,* Knobbed plates from the skin. *6,* Tentacle deposits. *7,* Knobbed buttons. *8,* Developing knobbed buttons.

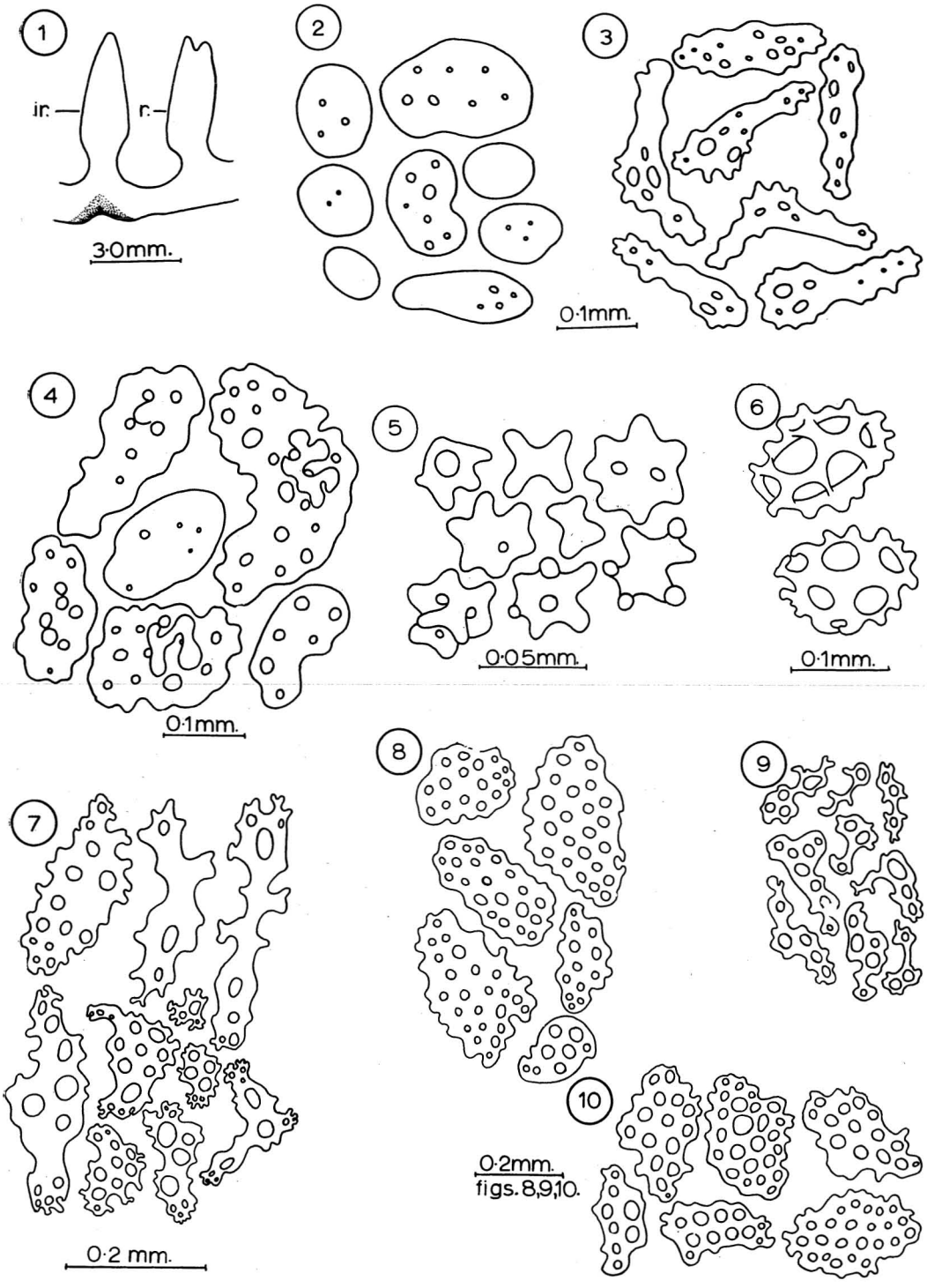

FIG. 2. *1–5, Trachythyone lechleri* (Lampert). *1*, Radial and interradial pieces of calcareous ring. *2*, Plates from the body wall. *3*, Tube foot deposits. *4*, Plates from the posterior extremity of the body. *5*, Rudimentary cups.

6–10, Neopsolidium convergens (Herouard). *6*, Cups from the dorsal skin. *7*, Tentacle deposits. *8*, Plates from the dorsal body wall. *9*, Buttons from the ventral body wall. *10*, Plates from the ventral body wall.

radials each have an anterior notch for insertion of retractor muscles (Fig. 2, *1*). There is a single tubular Polian vesicle about 40 mm in length, which arises from the water-vascular ring in the left dorsal interradius; the madreporite is a very small nodule about 1.5 mm in diameter, lying near the posterior edge of the calcareous ring in the middorsal interradius. The gonad comprises two bunches of elongate unbranched orange-coloured caeca, which attach to the long genital duct near the middle of the body in the middorsal interradius.

The skin is packed with great numbers of calcareous deposits, which chiefly take the form of thick, oval plates, with few perforations or none, and a length varying between 0.07 mm and 0.2 mm (Fig. 1, *2*). Overlying the plates are a small number of rudimentary "cups" which vary considerably in shape (Fig. 2, *5*), and occasionally carry short, blunt knobs, and may have up to three perforations. At the extreme posterior end of the body the plates are larger, and more complex, with a great number of perforations, and a tendency to become knobbed or two-layered (Fig. 2, *4*). These plates are up to 0.3 mm long. The tube feet contain stout end plates which are surrounded by perforated supporting deposits (Fig. 2, *3*), having an average length of about 0.2 mm.

Lampert (1895) apparently stated that this species has a calcareous ring with posterior prolongations, as Theel (1886*a*), after examining the "Challenger" specimens of *Thyone lechleri,* stated that "each piece (of the calcareous ring) ... has a bifurcate projection posteriorly." Then Theel (1886*b*) described a new species, *Thyone hassleri,* which resembled Lampert's *Thyone lechleri* in most respects, but lacks posterior processes on the calcareous ring. Ludwig (1898*a*) illustrated the calcareous ring of what he believed to be *Thyone lechleri,* and it is similar in every way to the ring illustrated in this paper (Fig. 2, *1*), and lacks forked posterior processes. Panning (1949) also states that the calcareous ring in species *lechleri* lacks posterior processes. Either Theel (1886*b*) was quite correct in erecting the species *hassleri* for those specimens with no posterior processes on the calcareous ring (in which case some specimens previous workers have assigned to species *lechleri* are in fact *hassleri*), or Lampert's type specimen of *lechleri* may have been unusual in possessing posterior processes. The calcareous deposits of species *lechleri* and *hassleri* are apparently identical and are so unique in character that it seems logical to leave the two species as synonyms. The problem cannot finally be resolved until Lampert's type material can be re-examined.

DISTRIBUTION: *Trachythyone lechleri* is known from the vicinity of Magellan Straits and Tierra del Fuego in depths up to 30 m. A single holothurian from Heard Is., resting in the collection of the Dominion Museum, Wellington, was identified by the author as *Trachythyone lechleri,* and thus the range of this species is now considerably extended.

Family PSOLIDAE

Genus *Neopsolidium* n. gen.

DIAGNOSIS: Small forms, with sole not sharply distinguished from the rest of the body. Dorsal deposits small (up to 0.4 mm) smooth perforated plates, and cups. Ventral deposits plates similar to dorsal plates and perforated buttons; no cups ventrally.

TYPE SPECIES: *Psolidium convergens* (Herouard).

REMARKS: Deichmann (1941, 1947) stated that the species *Psolidium convergens* deserves a separate genus because of the nature of its dorsal deposits, which differ from those in most other *Psolidium* species. This opinion was based chiefly on the thorough description and figures given by Perrier (1905) of this species. Clark (1946) agreed with Deichmann, but neither of these workers elected to propose a new generic name. Examination of specimens of *Psolidium convergens* in the Royal Society collection has convinced me that this species should be assigned to a separate genus. Although *Neopsolidium* is monotypic at present, it may accommodate some other *Psolidium* species, and future work will show whether or not this is possible.

The family Psolidae contains but a small number of genera, and the genus *Psolus* itself is in urgent need of revision. Such a revision is beyond the scope of this work.

KEY TO THE GENERA IN THE FAMILY PSOLIDAE

1(10). Tentacles 10.
2(7). Dorsal surface with tube feet.
3(4). Dorsal deposits include hourglass-shaped bodies, but lack cups or baskets..... *Thyonepsolus* Clark
4(3). Hourglass-shaped bodies lacking, cups or baskets present.
5(6). Sole sharply set off; dorsal deposits conspicuous scales, and small cups. Dorsal tube feet may pass through some of the scales. Sole deposits plates or buttons, usually with an external layer of small deep cups..... *Psolidium* Ludwig
6(5). Sole not sharply set off; dorsal deposits small (up to 0.4 mm), smooth perforated plates, and cups. Ventral deposits plates (similar to dorsal plates), and buttons (no cups)..... *Neopsolidium* n. gen.
7(2). Dorsal surface without tube feet.
8(9). Dorsal surface with imbricating scales. Mouth and anus dorsal..... *Psolus* Oken
9(8). Dorsal surface smooth, deposits sparingly scattered oval perforated plates, sometimes with warty surfaces, of average diameter 0.1 mm. Mouth terminal, anus subdorsal..... *Pseudopsolus* Ludwig
10(1). Tentacles 15..... *Stolinus* Selenka

Neopsolidium convergens (Herouard)

Cucumaria convergens Herouard, 1901, p. 30.
Psolidium convergens Perrier, 1904, p. 15; Perrier, 1905, p. 38, text figs. D–F, pl. 2, figs. 2–4; Herouard, 1906, p. 12, pl. 1, figs. 7, 8; pl. 2, figs. 10–12; Ekman, 1925, p. 111; Deichmann, 1947, p. 336.

DIAGNOSIS: As for the genus.

MATERIAL EXAMINED: Sta. 50, fragment of anterior end; Sta. 52, 2 specimens; Sta. 73, 1 specimen; Sta. 77, 2 specimens.

REMARKS: The material examined agrees well in most respects with the excellent descriptions and figures given by Perrier (1905) and Herouard (1906). The total length ranges between 18 mm and 22 mm while the juvenile specimen is 4 mm in length. Colour in alcohol is dirty white to light brown. The tentacles are orange to light brown, darker in colour than the rest of the body. Tube feet are restricted to the radii ventrally, where they are arranged in a double row in each radius. Near the extreme anterior and posterior ends of the body, the feet decrease in numbers and adopt a biserial arrangement. Dorsally the feet are scattered over both radii and interradii. The mouth and anus are slightly upturned. There are about 10 anal teeth or papillae.

Deposits in the dorsal skin are thick perforated plates 0.2–0.4 mm in length (Fig. 2, *8*). The plates are closely aggregated together and overlain by cups, which are 0.14 mm in diameter (Fig. 2, *6*). The cups are lacking in the juvenile specimen. Ventrally the plates are slightly more irregular in outline and are not so closely crowded together (Fig. 2, *10*). Intermingled with the ventral plates, and more numerous than they are irregular perforated buttons (Fig. 2, *9*). The tentacles contain perforated plates and button-like deposits in great numbers (Fig. 2, *7*). Some of these deposits are curved and carry small knobs.

This species differs from the others known in the region (*Psolidium dorsipes* and *P. disciformis*) in possessing the characteristic small dorsal plates, which have warranted erection of a new genus to accommodate it.

DISTRIBUTION: *Neopsolidium convergens* has been taken from the waters about Cape Horn, Magellan Straits, Falkland Is., and South Georgia, in depths ranging to about 15 m, and seems to favour life in the *Macrocystis* zone, where Herouard (1901) first discovered the species.

Genus *Psolus* Oken, 1815

DIAGNOSIS: Tentacles 10. Dorsal surface lacking tube feet, covered by imbricating scales. Sole sharply defined, deposits smooth or knobbed plates or buttons.

TYPE SPECIES: *Psolus phantapus* (Strussenfeldt).

REMARKS: This genus now contains over 30 species, which are spread widely over the Arctic and Antarctic regions and in the tropics. *Psolus* species are most common in shallow water, but some types are known from considerable depths.

Psolus patagonicus Ekman

Psolus patagonicus Ekman, 1925, p. 140, text figs. 35, 36; Deichmann, 1941, p. 148, pl. 30, fig. 8; Deichmann, 1947, p. 339, figs. 1, 2.

DIAGNOSIS: A small psolid, up to 20 mm in total length, with oral and anal valves, and radial teeth between them. Few scales between mouth and anus. Sole distinct with one or two marginal rows of tube feet. Mid-ventral radius naked. Sole deposits mostly four-holed knobbed buttons (average length 0.1 mm), together with a few small plates. Tentacles invested in smooth or knobbed perforated plates (0.07–0.17 mm in length).

MATERIAL EXAMINED: Sta. 39, 30, specimens; Sta. 40, 1 specimen.

DESCRIPTION: The specimens are small (total length ranges from 2.5 mm to 11 mm), dorsoventrally flattened, oval in outline, broadest near the anterior end. The dorsal surface carries mouth and anus, and is invested in overlapping plates. The ventral sole is soft. Colour in life "salmon-pink"; in alcohol, light yellowish-brown dorsally, orange-brown ventrally. The tentacles are orange-yellow, with some small brown spots.

The dorsal plates are about 0.8 mm broad and tend to overlap towards the midline, while the dorsal surface is bordered by one to three rows of smaller marginal plates (Fig. 3, *1*). The plates are thick, reticulated, and beset with minute knobs. The plates also carry a small number of tiny pearl-like grains, which are less common in smaller specimens. There are about five plates between mouth and anus.

The dendritic tentacles are extended in most specimens, and the ventral pair are somewhat smaller than the rest, unbranched or weakly branched. There are five conspicuous triangular interradial oral valves (Fig. 3, *1*), between and below which lie five radial valves, which are in the form of elongate isosceles triangles. In a small number of specimens, one to four smaller plates lie near the base of the oral valves, but these are not always present. The anal aperture is also covered by five radial valves and five anal valves (Fig. 3, *1*).

The soft sole is semitransparent and is bordered by a ring of tube feet in a single or sometimes double row. The mid-ventral radius is naked (Fig. 3, *2*).

The calcareous ring comprises five radials and five interradials fused together. Each radial piece has an anterior process with a deep, narrow notch. Interradials each have an anterior process with no notch. There are no posterior processes (Fig. 3, *6*). The ring is turned so as to lie parallel with the dorsal surface of the body to correspond with the dorsal position of the mouth. Therefore the mid-ventral radial piece is the most anterior portion of the ring.

The thin-walled intestine is coiled into three loops, and the mesentery of the posterior loop of the intestine lies as usual in the right ventral interradius. Overall, the intestine is a dark orange-brown in colour. A single bulbous Polian vesicle arises from the water vascular ring in the left ventral radius. The short stone canal and nodular madreporite lie in the middorsal interradius.

The gonads in the larger specimens are well developed as two bunches of light brown tubular unbranched caeca, which extend for the length of the body cavity. The genital duct proceeds along the dorsal side of the calcareous ring (or more correctly, the "posterior" side), and opens to the exterior immediately behind the tentacles, but apparently within the oral valves.

Apart from the dorsal surface, calcareous deposits are present in the sole, the tentacles, and the tube feet.

1. Sole deposits: The thin sole contains four-holed button (Fig. 3, *3*), and some slightly larger knobbed or smooth plates (Fig. 3, *3*). These deposits are sparingly scattered in the sole.

2. Tube foot deposits: Each tube foot has an end plate (Fig. 3, *7*) of average diameter 0.23 mm, which is surrounded by some curved perforated rods and plates, which may carry knob-like projections (Fig. 3, *5*). The length of these deposits varies between 0.06 mm and 0.2 mm.

3. Tentacle deposits: The tentacles are invested in a network of perforated rods and plates, some of which carry knobs (Fig. 3, *4*).

REMARKS: After having examined these specimens, I thought that I had found a new species, as they differ in some respects from Ekman's (1925) type specimen. Both Ekman (1925) and Deichmann (1941) state that *Psolus patagonicus* can have small intercalary plates between the larger dorsal plates. The photograph of Ekman's

(1925) specimen clearly shows these plates. None of the specimens I examined possess these intercalary plates. Ekman's specimen was 20 mm long, while the largest in the present collection is 11 mm in total length. This size discrepancy could explain the absence of intercalary plates in my material, as they may develop later in the life of the animal.

The present specimens closely resemble the type of *P. patagonicus* when their calcareous deposits are considered, and thus there is little doubt that they are in fact examples of Ekman's species.

DISTRIBUTION: The type specimen (Ekman, 1925) was collected from the Patagonian bank, 46° S, at a depth of 110 m. Deichmann (1941, 1947) states that the species has been taken from the type locality and various other localities in the Straits of Magellan. Present records indicate that *Psolus patagonicus* may be quite common in some localities, its small size perhaps enabling it to escape notice by the collector.

ORDER APODIDA

Family CHIRIDOTIDAE

Genus *Chiridota* Eschscholtz, 1829

Dactylota Brandt, 1835; *Liosoma* Brandt, 1835; *Trochinus* Ayres, 1852; *Lioderma* Bronn, 1860.

DIAGNOSIS: Tentacles 12, digits 3–10 on each side, the terminal pair being the longest. Polian vesicles numerous (3–20). Deposits six-spoked wheels collected into small papillae containing varying numbers of wheels of diverse sizes. No sigmoid rods, but small curved rods with enlarged ends may be present. Minute miliary granules often occur in the longitudinal muscles.

TYPE SPECIES: *Chiridota discolor* Eschscholtz.

REMARKS: This is a well-defined genus of world-wide distribution, containing about 25 species, none of which have a very extensive geographic range. Most species occur in shallow waters, although some have been taken at depths in excess of 3,500 m.

Chiridota pisanii Ludwig

Chiridota pisanii Ludwig, 1886, p. 29, pl. 2, fig. 14; Ludwig, 1898*a*, p. 71 (complete list of references); Ludwig, 1898*b*, p. 445; Clark, 1907, p. 118; Ekman, 1925, p. 145, text fig. 62; Heding, 1928, p. 297, text fig. 62; Heding, 1931, p. 676; Deichmann, 1947, p. 347.

Chirodota purpurea Theel, 1886*a*, pp. 15, 35, pl. 2, fig. 1; Lampert, 1889, p. 851.

DIAGNOSIS: Tentacles 12, usually with five pairs of digits each. Calcareous deposits wheels, which are arranged in papillae up to 1.5 mm in diameter. Papillae confined to the interradii, and are more numerous dorsally, where they are arranged in a single row in each interradius. No other deposits in the skin. Radial muscles contain miliary granules. Tentacle rods bracket-shaped, with branched ends, average length 0.05 mm.

MATERIAL EXAMINED: Sta. 73, four specimens.

REMARKS: The total length of the four specimens ranges between 11 mm and 60 mm. Colour in alcohol dirty white to light brown. There are 12 tentacles, each with five pairs of digits. The wheel papillae vary considerably in diameter, up to a maximum of 1 mm.

Dissection of the largest specimens revealed the presence of seven Polian vesicles, the largest being 7 mm in length. Rows of closely aggregated ciliated funnels lie in the middorsal and left lateral interradii, the rows commencing about 6 mm from the anterior end of the body cavity, and extending to the extreme posterior end. The genital tubules are long, sparsely branched, and packed with eggs averaging 0.3 mm in diameter. Deichmann (1947) has commented on the relationships of this species, and notes that deeper water forms are known which may perhaps be assigned to *Chiridota purpurea* Theel.

DISTRIBUTION: *Chiridota pisanii* is known from both coasts of southern South America, and the Falkland Is., from the intertidal zone to about 100 m.

Genus *Trochodota* Ludwig, 1892

DIAGNOSIS: Tentacles 10, digits 2–6 on each side. One Polian vesicle and one stone canal. Calcareous ring comprises 10 pieces, the radial unperforated. Calcareous deposits sigmoid hooks, scattered or arranged into groups, and wheels,

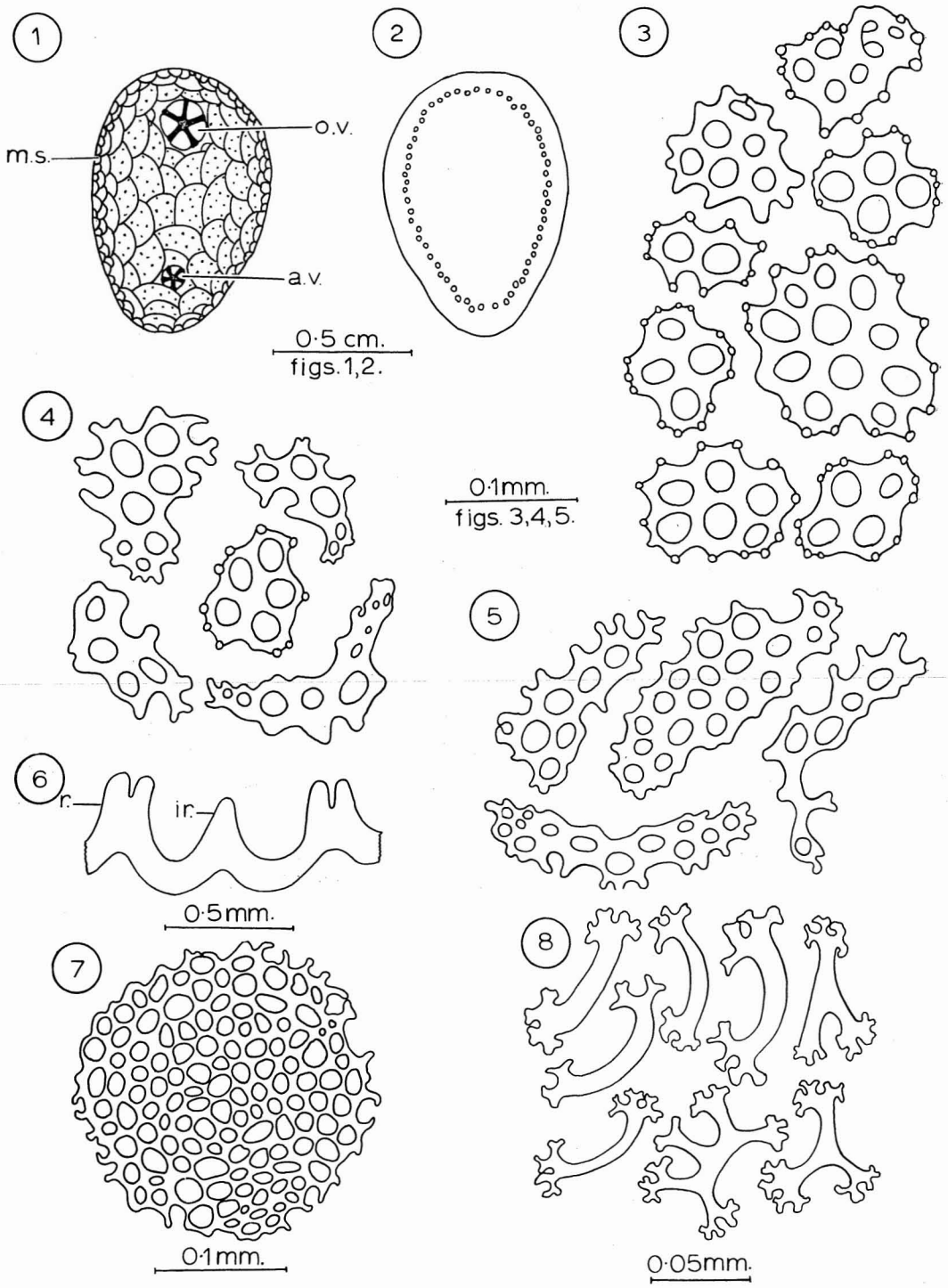

FIG. 3. *1–7, Psolus patagonicus* Ekman. *1,* Dorsal view of 9 mm specimen. *2,* Ventral view of same specimen, showing disposition of tube feet. *3,* Plates and buttons. *4,* Tentacle deposits. *5,* Tube foot deposits. *6,* Portion of calcareous ring. *7,* End plate of tube foot.

8, Trochodota purpurea (Lesson), tentacle deposits.

scattered and never grouped into papillae. (After Clark, 1907.)

TYPE SPECIES: *Trochodota purpurea* (Lesson).

REMARKS: This is a well-defined, cosmopolitan genus, containing about a dozen species, some of which are inadequately described. There are three species in Australia, two in New Zealand, and one in southern South America. *T. dunedinensis* from New Zealand resembles *T. purpurea* from South America in many respects, and the two species may be related.

Trochodota purpurea (Lesson)

Holothuria (Fistularia) purpurea Lesson, 1830, p. 155, pl. 53, fig. 1.
Chirodota purpurea Jager, 1833, p. 16; Dujardin and Hupe, 1862, p. 616.
Chiridota purpurea Brandt, 1835, p. 259.
Sigmodota purpurea Studer, 1876, p. 454 (partim).
Chirodota australiana Theel, 1886*a*, p. 16.
Chirodota studeri Lampert, 1889, p. 839, pl. XXIV, fig. 12.
Trochodota studeri Ludwig, 1892, p. 359.
Sigmodota studeri Oestergren, 1898.
Trochodota purpurea Ludwig, 1898*a*, p. 83, pl. III, figs. 43–45; Perrier, 1905, p. 76; Clark, 1907, p. 123; Clark, 1921, p. 166; Ekman, 1925, p. 149; Deichmann, 1947, p. 351.

DIAGNOSIS: Tentacles 10, each with 2–6 pairs of digits. Wheels (0.13–0.18 mm diameter) scattered in the skin, together with sigmoid hooks (0.12–0.13 mm long). Tentacle deposits, when present, average 0.078 mm in length, and are bracket-shaped, with dichotomously branching ends. Colour in life commonly purple.

MATERIAL EXAMINED: Sta. 73, 8 specimens; Sta. 74, 2 specimens; Sta. 77, 1 specimen.

REMARKS: The smallest specimen in the collection is 4 mm in total length, and the largest is 100 mm. Colour in alcohol ranges from off white to light brown or violet. The number of tentacle digits varies. Clark (1921) in his key to the species of *Trochodota* stated that species *purpurea* has tentacles with six digits each. In the present collection, one specimen has 12 digits per tentacle, and another has eight. Clearly the number of tentacle digits is not a reliable diagnostic character in this species. The calcareous deposits in the skin have been well described.

The tentacles in some of the specimens contain a number of bracket-shaped rods with dichotomously branching ends (Fig. 3, 8). Perrier (1905) stated that the tentacles in his material were "totally devoid of calcareous deposits," while Deichmann (1947), in diagnosing this species, wrote ". . . no spicules in the tentacles." Ludwig (1898*a*) illustrated a single tentacle rod, and it closely resembles those illustrated here. There is no doubt, then, that tentacle deposits may be present, perhaps in young stages, and become rare or disappear as a specimen grows, as can happen with the wheels and hooks in the body wall.

DISTRIBUTION: *Trochodota purpurea* is recorded from the southern tip of South America and the Falkland Is., to depths of about 50 m. Habitat includes sand, shelly bottom, and holdfasts and fronds of seaweed, especially *Macrocystis*.

Genus *Taeniogyrus* Semper, 1868

Sigmodota Studer, 1876.

DIAGNOSIS: Tentacles peltato-digitate, 10 or 12. Digits five to seven pairs per tentacle, the terminal pair being the longest. Calcareous deposits are wheels gathered into papillae, and sigmoid hooks (about 0.2 mm long), scattered in the skin. No miliary granules in radial longitudinal muscles.

TYPE SPECIES: *Taeniogyrus australianus* Stimpson.

REMARKS: This is a small genus containing about six species. Three species are known from Australia, one from Japan, one from Hawaii, and one from the southeast Pacific Ocean.

Taeniogyrus lies intermediate between *Chiridota* (wheels and occasionally curved rods, no sigmoid hooks) and *Trochodota* (wheels, and sigmoid hooks, the wheels not grouped into papillae).

Taeniogyrus contortus (Ludwig)

Chiridota contorta Ludwig, 1874, p. 80, pl. VI, fig. 6; Lampert, 1885, p. 234; Theel, 1886*a*, pp. 16, 33, pl. 2, fig. 2; Theel, 1886*b*, p. 20; Lampert, 1889, pp. 851, 853.
Sigmodota purpurea Studer, 1876, p. 454; Studer, 1879, p. 123.

Chirodota purpurea Bell, 1881, p. 101; Lampert, 1885, p. 236; Lampert, 1886, p. 18, figs. 17–20; Ludwig, 1886, p. 29.
Chirodota studerii Theel, 1886*a*, p. 33.
Chiridota contorta Ludwig, 1892, p. 359; Ludwig, 1897, p. 217; Ludwig, 1898*a*, p. 73, pl. III, figs. 37–42.
Sigmodota contorta Ostergren, 1898; Sluiter, 1901, p. 134.
Taeniogyrus contortus Clark, 1907, p. 122, pl. VII, figs. 8–13; Clark, 1921, p. 165; Ekman, 1925, p. 147; Heding, 1928, p. 311, text fig. 66, 1–9; Deichmann, 1947, p. 348.

DIAGNOSIS: Tentacles 12, with five to seven pairs of digits. Wheels (diameter 0.042–0.13 mm) gathered into well-defined papillae; sigmoid hooks large (0.14–0.2 mm long) scattered in the skin. Tentacle rods 0.17 mm in length.

MATERIAL EXAMINED: Sta. 73, one specimen.

REMARKS: The single specimen is 50 mm in total length and has only 11 tentacles. Colour in alcohol is a dull, dark brown. The systematic position of *Taeniogyrus contortus* is now quite clear as a result of the work of Clark (1907, 1921) and Heding (1928).

DISTRIBUTION: The species is known from the southern tip of South America, Falkland Is., South Georgia, Burwood Bank, and Kerguelen Is., to depths of about 200 m. Sluiter (1901) recorded *Sigmodota contorta* from the Java Sea at a depth of 82 m. Clark (1921) doubted the accuracy of the identification, and it might well be that Sluiter's material represents yet another species. Fisher (1907) found a close relative to *T. contortus* in Hawaii.

DISCUSSION

1. The Holothurian Fauna of Southern Chile

Collections made at 18 stations in the Isla Chiloe area revealed only one species, namely *Athyonidium chilensis,* while at least seven shallow-water species are known from this region. *Athyonidium chilensis* is one of the most conspicuous holothurians in Peru and Chile, and Isla Chiloe represents the extreme southern limit of the range of the species.

From Puerto Eden to Punta Arenas, 31 stations were worked, and holothurians were taken from five stations. They were *Pseudocnus dubiosus, Stereoderma laevigata,* and *Psolus patagonicus.*

By far the most common species here was *Pseudocnus dubiosus,* which was collected in numbers at four of the five stations. This species, together with *Cladodactyla crocea* and *Stereoderma laevigata,* seems to favour the *Macrocystis* zone as a habitat.

Seven species were found at Isla Navarino and the southern regions, at six of the 29 stations worked. They were *Pseudocnus dubiosus, Cladodactyla crocea, Trachythyone lechleri, Neopsolidium convergens, Chiridota pisanii, Trochodota purpurea,* and *Taeniogyrus contortus.*

Of these seven species, three are apodous forms. In an account of the marine work carried out by the Royal Society Expedition, Prof. Knox (personal communication) noted that "one of the salient features of the southern region is the reduction which has occurred in the number of species present," and he cited the case of species of Brachyura (Crustacea), of which there were 15 at Chepu (Isla Chiloe), and only two in the southern regions. This state of affairs clearly does not apply to the holothurians, as at least 14 species are known from the southern region, while approximately seven have been recorded from the Isla Chiloe area.

Between Isla Chiloe and Isla Navarino the character of the holothurian fauna changes, and the number of species gradually increases. There are no drastic changes which might indicate a provincial pattern, although the number of species shows a definite increase at about 52° S, immediately north of the western entrance to the Straits of Magellan.

Apodous species (e.g., *Trochodota purpurea, Chiridota pisanii,* and *Taeniogyrus contortus*) are more numerous in the southern regions than elsewhere on the Chile coast, but there is no apparent reason why this should be the case.

The fauna of Chile contains a remarkably high percentage of cucumariids (ca. 40%), compared with that of New Zealand (33%) and Australia (22%). This is a striking feature of the fauna, as also is the virtual absence of phyllophorids below about 42° S, whereas New Zealand has 15%, and Australia 14%.

2. Relationships of the Fauna

A. With Australia, New Zealand, and the

Antipodean Province Islands: The holothurian fauna of southern Chile bears no close relationship to that of New Zealand and Australia. A single species, *Paracaudina chilensis,* is common to New Zealand and southern Chile, and this species is a circum-Pacific eurybath form. *Ocnus calcareus* is known from New Zealand and Juan Fernandez, but has not as yet been recorded from the Chilean coast. The Antipodean Province Islands (Auckland Is., Campbell Is. in particular) of New Zealand support a holothurian fauna of New Zealand character, and thus the fauna differs fundamentally from that of other southern islands such as Kerguelen, Macquarie, South Georgia. However, one Antipodean Province species, *Stereoderma leoninoides* (Mortensen) is a close relative of *Stereoderma laevigata* from southern Chile, and it is quite possible that these two species may have been derived from some common source.

B. With that of Antarctica: Some species, including *Cladodactyla crocea, Stereoderma laevigata, Trachythyone parva,* and *Psolus antarcticus,* are shared with the fauna of Antarctica. Fell (1961), in discussing the Ophiuroidea of Antarctica, stated that the Magellanic ophiuroid fauna is predominantly of southern American type, mingled with a few Antarctic species which are eurythermal. The four species mentioned above are probably eurythermal and can readily survive the difference in temperature between Antarctica and southern Chile.

C. With that of the Subantarctic Islands: The Falkland Islands (Islas Malvinas) have a holothurian fauna which is scarcely distinguishable from that of southern Chile. This is understandable when one considers that the islands are but 300 miles east of Tierra del Fuego, in a good position to accept species carried from southern South America by the westwind drift.

Among the Kerguelen Island holothurians are *Cladodactyla crocea, Stereoderma laevigata, Trachythyone parva,* and *Taeniogyrus contortus.* Thus the fauna here also bears a remarkable likeness to that of southern Chile.

South Georgia, regarded as a separate biotic province by Knox (1960), shares *Cladodactyla crocea, Trachythyone parva, Stereoderma laevigata, Neopsolidium convergens, Taeniogyrus contortus,* and (with doubt) *Anapta fallax* with southern Chile.

Stereoderma laevigata is also known in the fauna of Marion Island and the Crozets.

When considered overall, these islands have faunas which are similar to that of southern Chile, and the similarity is at the specific level. The dispersal of species to these widely separated areas is probably effected epiplanktonically (perhaps on rafts of seaweed), with the aid of the westwind drift. This is quite conceivable for such species as *Stereoderma laevigata* and *Cladodactyla crocea,* which commonly live on the fronds and holdfasts of *Macrocystis,* a brown seaweed which is found on all of the islands mentioned above. The westwind drift dispersal mechanism for echinoderms has already been discussed by Mortensen (1925), Fell (1953, 1962), and Ekman (1953), and others.

The holothurian fauna of southern Chile is a generalised fauna, containing few restricted species, and notable because of the number of species which are shared with distant islands, and the Antarctic continent.

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